

IN THE CLAIMS:

Claim 1 (currently amended): An offset measuring mechanism in a bonding apparatus that includes:

a position detection camera that detects the position of a part to be bonded on a bonding working plane,

a bonding tool that is disposed with an offset from said position detection camera, and

a moving means for moving said position detection camera and said bonding tool as an integral unit on a plane parallel to said bonding working plane,

wherein said offset measuring mechanism that measures said offset comprises:

an offset measuring camera which is disposed on an opposite side of said bonding working plane from said position detection camera and said bonding tool and which faces said bonding working plane;

an imaging position measuring means which uses said moving means to move said position detection camera into a measurement range of said offset measuring camera and determines a reference position of an imaging range in an imaging plane of said position detection camera based upon measurement of said imaging plane of said position detection camera by said offset measuring camera;

a tool position measuring means which uses said moving means to move said bonding tool into said measurement range of said offset measuring camera and measures a tool position of said bonding tool with said offset measuring camera; and

an offset calculating means which calculates said offset based upon a measured value of said determined reference position of said imaging range and a measured value of said tool position[.]; and

said position detection camera has a plurality of imaging elements disposed in two dimensions in directions of mutually perpendicular element disposition axes which are associated with mutually perpendicular imaging reference axes of said imaging plane; and

said reference position of said imaging range is a reference position of said two-dimensional disposition of said plurality of imaging elements.

Claim 2 (cancelled).

Claim 3 (cancelled).

Claim 4 (currently amended): The offset measuring mechanism according to ~~any one of Claims 1 through 3~~ Claim 1, wherein an object plane of said position detection camera and an object plane of said offset measuring camera coincide.

Claim 5 (currently amended): The offset measuring mechanism according to ~~any one of Claims 1 through 3~~ Claim 1, wherein said offset measuring camera has an object side telecentric optical system.

Claim 6 (currently amended): The offset measuring mechanism according to ~~any one of Claims 1 through 3~~ Claim 1, further comprising an offset measuring camera magnification calculating means, wherein said offset measuring camera magnification calculating means:

uses said moving means to move said bonding tool into said measurement range of said offset measuring camera and to further move said bonding tool within said measurement range so as to measure an amount of movement of an image of said bonding tool on said imaging plane of said offset measuring camera corresponding to said amount of movement; and

calculates magnification of said offset measuring camera based upon an amount of movement of said bonding tool and an amount of movement of said image of said bonding tool.

Claim 7 (currently amended): The offset measuring mechanism according to Claim ~~[[2]]~~ 1, further comprising a position detection camera magnification calculating means, wherein said position detection camera magnification calculating means:

uses said moving means to move said bonding tool into a measurement range of said offset measuring camera; and

calculates a magnification of said position detection camera based upon measurement of predetermined dimensions of said plurality of imaging elements by said offset measuring camera.

Claim 8 (cancelled).

Claim 9 (currently amended): The offset measuring mechanism according to ~~any one of Claims 1 through 3~~ Claim 1, further comprising an offset measuring camera

inclination calculating means, wherein said offset measuring camera inclination calculating means:

uses said moving means to move said bonding tool into a measurement range of said offset measuring camera and to further move said bonding tool within said measurement range;

measures a movement direction of an image of said bonding tool on said imaging plane of said offset measuring camera corresponding to said movement relative to mutually perpendicular measurement reference axes on said imaging plane of said offset measuring camera; and

calculates a relative inclination between movement reference axes of said moving means and measurement reference axes of said offset measuring camera based upon a movement direction of said bonding tool relative to mutually perpendicular movement reference axes of said moving means and a movement direction of an image of said bonding tool.

Claim 10 (currently amended): The offset measuring mechanism according to Claim [[2]] 1, further comprising a position detection camera inclination calculating means, wherein said position detection camera inclination calculating means:

uses said moving means to move said position detection camera into a measurement range of said offset measuring camera, and

calculates a relative inclination of imaging reference axes of said position detection camera and measurement reference axes of said offset measuring camera based upon measurement of inclination of said element disposition axes relative to mutually perpendicular measurement reference axes in said imaging plane of said offset measuring camera.

Claim 11 (cancelled).

Claim 12 (cancelled).

Claim 13 (new): An offset measuring mechanism in a bonding apparatus that includes:

a position detection camera that detects the position of a part to be bonded on a bonding working plane,

a bonding tool that is disposed with an offset from said position detection camera, and

a moving means for moving said position detection camera and said bonding tool as an integral unit on a plane parallel to said bonding working plane,

wherein said offset measuring mechanism that measures said offset comprises:

an offset measuring camera which is disposed on an opposite side of said bonding working plane from said position detection camera and said bonding tool and which faces said bonding working plane;

an imaging position measuring means which uses said moving means to move said position detection camera into a measurement range of said offset measuring camera and determines a reference position of an imaging range in an imaging plane of said position detection camera based upon measurement of said imaging plane of said position detection camera by said offset measuring camera;

a tool position measuring means which uses said moving means to move said bonding tool into said measurement range of said offset measuring camera and measures a tool position of said bonding tool with said offset measuring camera; and

an offset calculating means which calculates said offset based upon a measured value of said determined reference position of said imaging range and a measured value of said tool position; and

further comprising an offset measuring camera inclination calculated means, wherein said offset measuring camera inclination calculated means:

uses said moving means to move said bonding tool into a measurement range of said offset measuring camera and to further move said bonding tool within said measurement range;

measures a movement direction of an image of said bonding tool on said imaging plane of said offset measuring camera corresponding to said movement relative to mutually perpendicular measurement reference axes on said imaging plane of said offset measuring camera; and

calculates a relative inclination between movement reference axes of said moving means and measurement reference axes of said offset measuring camera based upon a movement direction of said bonding tool relative to mutually perpendicular

movement reference axes of said moving means and a movement direction of an image of said bonding tool.